

WHAT IS CLAIMED IS

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1. A processing tool for carrying out a fixed-abrasive grinding process on a surface of a silicon work-piece, comprising:
abrasive grains made up silica grains.

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2. The silicon processing tool as claimed in claim 1, wherein a primary average grain size of the silica grains is 0.8 nm to 10 μ m.

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3. The processing tool as claimed in claim 1, wherein a content of the silica grains in the abrasive grains is 10 to 70 volume percent.

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4. The processing tool as claimed in claim 1,
further comprising:

a binder bonding the abrasive grains, said binder
being made of a material which generates no endothermic
5 reaction during the process carried out on the silicon
work-piece.

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5. The processing tool as claimed in claim 1,
further comprising:

an additive mixed to the abrasive grains, said
additive being made of a material which generates no
15 endothermic reaction during the process carried out on
the silicon work-piece.

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6. The processing tool as claimed in claim 1,
wherein the abrasive grains form a grindstone.

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7. The processing tool as claimed in claim 1,
wherein the abrasive grains form a film.

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8. The processing tool as claimed in claim 7,
wherein the film is flexible.

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9. A method of producing a processing tool
having abrasive grains for carrying out a fixed-abrasive
15 grinding process on a surface of a silicon work-piece,
said method comprising the step of:

(a) mixing a binder and silica grains to form a
mixture; and

(b) forming the mixture into the abrasive grains
20 of the processing tool.

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10. The method of producing the processing

tool as claimed in claim 9, wherein said step (a) uses silica grains having a primary average grain size of 0.8 nm to 10 μ m.

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11. The method of producing the processing tool as claimed in claim 9, wherein said step (a) uses a content of the silica grains in the abrasive grains in a range of 10 to 70 volume percent.

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12. The method of producing the processing tool as claimed in claim 9, wherein said step (a) uses a binder made of a material which generates no endothermic reaction during the process carried out on the silicon work-piece by the processing tool.

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13. A processing method for carrying out a

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fixed-abrasive grinding process on a surface of a silicon work-piece, comprising the steps of:

(a) positioning the silicon work-piece relative to a processing tool having abrasive grains made up silica grains; and

(b) processing the surface of the silicon work-piece by the abrasive grains of the processing tool.

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14. The processing method as claimed in claim 13, wherein the silica grains have a primary average grain size of 0.8 nm to 10 μ m.

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15. The processing method as claimed in claim 13, wherein a content of the silica grains in the abrasive grains in a range of 10 to 70 volume percent.

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16. The processing method as claimed in claim
13, wherein the tool includes a binder which bonds the
abrasive grains and is made of a material which
generates no endothermic reaction during the process
5 carried out on the silicon work-piece.

10 17. A processing method for carrying out a
process on a disk-shaped or donut-shaped work-piece,
comprising the steps of:

(a) grinding an outer peripheral surface of the
work-piece by a grindstone; and

15 (b) polishing cutout part on the outer peripheral
surface of the work-piece and/or an inner peripheral
surface of the work-piece by a polishing film.

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18. The processing method as claimed in claim
17, wherein said step (a) uses a grindstone including
abrasive grains which generate mechano-chemical reaction
25 with respect to a processing surface of the work-piece.

19. The processing method as claimed in claim 18, wherein the abrasive grains have a primary average grain size of 0.8 nm to 10 μ m.

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20. The processing method as claimed in claim 17, wherein said step (b) uses a polishing film including abrasive grains which generate mechano-chemical reaction with respect to a processing surface of the work-piece.

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21. The processing method as claimed in claim 20, wherein said step (b) uses a flexible polishing film.

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22. The processing method as claimed in claim 20, wherein the abrasive grains have a primary average grain size of 0.8 nm to 10 μ m.

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23. The processing method as claimed in claim 17, wherein said steps (a) and (b) respectively carry out a dry grinding process and a dry polishing process.

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24. A processing apparatus for carrying out a process on a disk-shaped or donut-shaped work-piece, comprising:

a grinding unit grinding an outer peripheral surface of the work-piece by a grindstone;

a polishing unit polishing cutout part on the outer peripheral surface of the work-piece and/or an inner peripheral surface of the work-piece by a polishing film; and

a transport unit transporting the work-piece at least between the grinding unit and the polishing unit and positioning the work-piece in the grinding unit and the polishing unit.

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25. The processing apparatus as claimed in

claim 24, wherein said grinding unit includes a grindstone having abrasive grains which generate mechano-chemical reaction with respect to a processing surface of the work-piece.

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26. The processing apparatus as claimed in claim 25, wherein the abrasive grains have a primary average grain size of 0.8 nm to 10 μ m.

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27. The processing apparatus as claimed in claim 24, wherein said polishing unit includes a polishing film having abrasive grains which generate mechano-chemical reaction with respect to a processing surface of the work-piece.

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28. The processing apparatus as claimed in

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claim 27, wherein said polishing film is flexible.

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29. The processing apparatus as claimed in claim 27, wherein the abrasive grains have a primary average grain size of 0.8 nm to 10 μ m.

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30. The processing apparatus as claimed in claim 24, wherein said grinding unit and said polishing unit respectively carry out a dry grinding process and a dry polishing process.

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